Integrating Design and Support

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Context

- **Design**
  - Pre MS C activities during which the translation of warfighting requirements into ‘manufacturable’ and ‘fieldable’ implementations occurs
  - Engineering activities for system changes during production or support

- **Support**
  - Logistics (sparing, training, maintenance) and engineering (ECPs, technical support) activities which occur when a system is in operation

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Relevant Topics

- **Experiences doing in-service engineering support**
  - 688-class submarine Vertical Launch System
  - USS Bremerton overhaul, Pearl Harbor HI
- **Integrated Product & Process Development**
  - Virginia Class Submarine
- **Emerging technologies to enable better design and support integration**
  - Model-based Engineering & Digital Engineering
  - Digital-enabled manufacturing & additive manufacturing
  - Reverse engineering for diminishing sources

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Issues

- **Underlying characteristics of support are determined during design**
  - Reliability
  - Design for maintenance
  - Maintenance procedures
  - Sparing & Support concepts

- **The need for engineering doesn’t end at MS C**

- **Technology advancements specific to engineering, manufacturing, sparing, and reverse engineering are likely to change the way we transition to and provide support for in-service systems**

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Recommendations

- **Have designers spend the early parts of their career doing engineering support for in-service systems**
- **Employ IPPD approaches during the design process**
- **Track progress in digital engineering, digital manufacturing; emerging advances in Additive Manufacturing, diminishing sources approaches**
  - Increase inherent suitability of designs for operation & support
  - More efficient and effective transition from design to production to operation
  - More alternatives to providing spares and doing repairs

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